

Intertek

ETL SEMKO

## CCT R&D Ltd.

### Application For Certification

2.4GHz/900MHz 35 Channel Analog Modulation Cordless Phone with  
Caller ID – Handset

**(FCC ID: NC8KX-TG2120H)**

06088432  
KL/ Ann Choy  
May 19, 2006

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**Intertek Testing Services Hong Kong Ltd.**

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## MEASUREMENT/TECHNICAL REPORT

**CCT R&D Ltd. - Model: KX-TG2120X, KX-TG2122X,  
KX-TGA210X, KX-TGA211X  
FCC ID: NC8KX-TG2120H**

This report concerns (check one):      Original Grant       Class II Change

Equipment Type : DXT - Cordless Telephone

Deferred grant requested per 47 CFR  
0.457(d)(1)(ii)?      Yes       No

If yes, defer until : \_\_\_\_\_  
date

Company Name agrees to notify the Commission  
by:

\_\_\_\_\_  
date

of the intended date of announcement of the product so that the grant can be issued  
on that date.

Transition Rules Request per 15.37 ?      Yes       No

If no, assumed Part 15, Subpart C for intentional radiator - the new 47 CFR [04-05-05  
Edition] Provision.

Report prepared by:

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### List of attached file

| Exhibit type          | File Description              | filename            |
|-----------------------|-------------------------------|---------------------|
| Cover Page            | Confidentiality Request       | request.pdf         |
| Test Report           | Test Report                   | report.pdf          |
| Operation Description | Technical Description         | descri.pdf          |
| Test Setup Photo      | Radiated Emission for Handset | config photos.doc   |
| Test Report           | Emission Plot                 | emission.pdf        |
| External Photo        | External Photo                | external photos.doc |
| Internal Photo        | Internal Photo                | internal photos.doc |
| Block Diagram         | Block Diagram                 | block.pdf           |
| Schematics            | Circuit Diagram               | circuit.pdf         |
| ID Label/Location     | Label Artwork and Location    | label.pdf           |
| User Manual           | User Manual                   | manual.pdf          |
| User Manual           | FCC Information               | fcc information.pdf |

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**EXHIBIT 1**  
**GENERAL DESCRIPTION**

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## 1.0 General Description

### 1.1 Product Description

The KX-TG2122 is 2.4GHz/900MHz 35 Channel Analog Modulation Cordless Phone with Caller ID. Base unit and handset operate at frequency of 2480.059MHz to 2482.901MHz and 911.172MHz to 913.067MHz respectively. The unit is capable of either tone or pulse dialing. The internal power supply's isolation is accomplished through a power transformer having an adequate dielectric rating. The circuit wiring is consistent under the requirement of part 68.

The handset unit consists of a keypad with twelve standard keys (0,...9,\*,#), seven function keys (REDIAL/PAUSE, FLASH, CID/VOL up, CID/VOL down, EDIT, MUTE/CLEAR, AUTO/FUNCTION), and one channel switch key. A Talk and OFF keys are provided to control pick/release telephone line in a toggle base.

The base unit has a page key, which is used to page the handset unit.

The antennas used in base unit and handset are integral, and the tested sample is a prototype.

The Model: KX-TG2122 is one of the Model: KX-TG2122X. The Handset of Model: KX-TG2120X, KX-TGA210X, KX-TGA211X are the same as the Model: KX-TG2122X in hardware aspect. Suffix "X" represents cosmetic changes and serves as marketing strategy, but does not affect Part 15 compliance. The difference in model number serves as marketing strategy.

The circuit description is saved with filename: descri.pdf

Connection between the device and the telephone network is accomplished through the use of USOC RJ11C in the 2-wire loop calling central office line.

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### 1.2 Related Submittal(s) Grants

This is a single application for Certification of handset of a cordless telephone system. The FCC ID of the associated base unit is NC8KX-TG2120 and has been filed at the same time as this application. This specific report details the emission characteristics of each transmitter. The receivers are subject to the verification authorization process, in accordance with 15.101(b). A verification report has been prepared for the receiver sections of each device. The device is also subject to Part 68 Registration.

### 1.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.4 (2003). All measurements were performed in Open Area Test Sites. Preliminary scans were performed in the Open Area Test Sites only to determine worst case modes. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the **"Justification Section"** of this Application.

### 1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. This test facility and site measurement data have been fully placed on file with the FCC.

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**EXHIBIT 2**  
**SYSTEM TEST CONFIGURATION**

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### 2.0 System Test Configuration

#### 2.1 Justification

For emissions testing, the equipment under test (EUT) was setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables were manipulated to produce worst case emissions. The handset was powered by a fully charged battery.

For the measurements, the EUT is attached to a plastic stand if necessary and placed on the wooden turntable. If the base unit attaches to peripherals, they are connected and operational (as typical as possible). The handset is remotely located as far from the antenna and the base as possible to ensure full power transmission from the base. Else, the base is wired to transmit full power without modulation.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

#### 2.2 EUT Exercising Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

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### 2.3 Support Equipment List and Description

Applicant's submitted support equipment and/or accessories are listed below:

- (1) Handset: A "Ni-Cd" type rechargeable battery (3.6V 600mAh)

The FCC ID's for all equipment, plus descriptions of all cables used in the tested system are:

#### *HARDWARE:*

The unit was operated standalone. A battery (provided with the unit) was used to power the device. Its description is listed below.

- (1) Handset: A "Ni-Cd" type rechargeable battery (3.6V 600mAh)

#### *CABLES:*

There are no special accessories necessary for compliance of this product.

#### *OTHERS:*

- (1) A headset for telephone use with 1.2m unshielded cable permanently affixed.

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### 2.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty test has been considered.

Uncertainty and Compliance – Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

### 2.5 Equipment Modification

Any modifications installed previous to testing by CCT R&D Ltd. will be incorporated in each production model sold/leased in the United States.

No modifications were installed by ETL Division, Intertek Testing Services Hong Kong Ltd.

All the items listed under section 2.0 of this report are confirmed by:

*Confirmed by:*

*Lam Chun Cheong, Kenneth  
Senior Lead Engineer  
Intertek Testing Services  
Agent for CCT R&D Ltd.*



Signature

\_\_\_\_\_  
May 24, 2006 \_\_\_\_\_ Date

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**EXHIBIT 3**  
**EMISSION RESULTS**

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### 3.0 Emission Results

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

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### 3.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

where  $FS$  = Field Strength in  $\text{dB}\mu\text{V}/\text{m}$

$RA$  = Receiver Amplitude (including preamplifier) in  $\text{dB}\mu\text{V}$

$CF$  = Cable Attenuation Factor in dB

$AF$  = Antenna Factor in dB

$AG$  = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:-

$$FS = RR + LF$$

where  $FS$  = Field Strength in  $\text{dB}\mu\text{V}/\text{m}$

$RR$  =  $RA - AG$  in  $\text{dB}\mu\text{V}$

$LF$  =  $CF + AF$  in dB

Assume a receiver reading of 52.0  $\text{dB}\mu\text{V}$  is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32  $\text{dB}\mu\text{V}/\text{m}$ . This value in  $\text{dB}\mu\text{V}/\text{m}$  was converted to its corresponding level in  $\mu\text{V}/\text{m}$ .

$$RA = 52.0 \text{ dB}\mu\text{V}$$

$$AF = 7.4 \text{ dB}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$FS = RR + LF$$

$$FS = 23 + 9 = 32 \text{ dB}\mu\text{V}/\text{m}$$

$$RR = 23.0 \text{ dB}\mu\text{V}$$

$$LF = 9.0 \text{ dB}$$

$$\text{Level in } \mu\text{V}/\text{m} = \text{Common Antilogarithm } [(32 \text{ dB}\mu\text{V}/\text{m})/20] = 39.8 \mu\text{V}/\text{m}$$

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### **3.2 Radiated Emission Configuration Photograph - Handset**

Worst Case Radiated Emission

at 455.586 MHz

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: config photos.doc

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### 3.3 Radiated Emission Data - Handset

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Judgement : Passed by 4.0 dB margin

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#### **TEST PERSONNEL:**



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*Tester Signature*

Jess Tang, Lead Engineer  
Typed/Printed Name

May 24, 2006  
Date

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Company: CCT R&D Ltd.

Date of Test: April 28-May 12, 2006

Model: KX-TG2122

Mode : TX-Channel 1

Table 1, Handset

### Radiated Emissions

| Polarization | Frequency<br>(MHz) | Reading<br>(dB $\mu$ V) | Pre-<br>Amp<br>(dB) | Antenna<br>Factor<br>(dB) | Net<br>at 3m<br>(dB $\mu$ V/m) | Limit<br>at 3m<br>(dB $\mu$ V/m) | Margin<br>(dB) |
|--------------|--------------------|-------------------------|---------------------|---------------------------|--------------------------------|----------------------------------|----------------|
| H            | 911.172            | 71.1                    | 16                  | 33.0                      | 88.1                           | 94                               | -5.9           |
| H            | 455.586            | 32.0                    | 16                  | 26.0                      | 42.0                           | 46                               | -4.0           |
| H            | *1366.758          | 45.0                    | 34                  | 26.1                      | 37.1                           | 54                               | -16.9          |
| H            | 1822.343           | 44.8                    | 34                  | 27.2                      | 38.0                           | 54                               | -16.0          |
| V            | *2277.929          | 45.5                    | 34                  | 29.4                      | 40.9                           | 54                               | -13.1          |
| V            | *2733.515          | 46.0                    | 34                  | 30.4                      | 42.4                           | 54                               | -11.6          |
| H            | *3644.687          | 40.6                    | 34                  | 33.3                      | 39.9                           | 54                               | -14.1          |
| H            | *4555.859          | 39.4                    | 34                  | 34.9                      | 40.3                           | 54                               | -13.7          |
| H            | 5467.030           | 40.9                    | 34                  | 35.7                      | 42.6                           | 54                               | -11.4          |
| H            | 6378.202           | 39.2                    | 34                  | 36.9                      | 42.1                           | 54                               | -11.9          |

NOTES: 1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emissions radiated outside of the specified frequency bands, except harmonics, are attenuated by 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation, which meet the requirement of part 15.249(d).

\* Emission within the restricted band meets the requirement of part 15.205.

Test Engineer: Jess Tang

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Company: CCT R&D Ltd.

Date of Test: April 28-May 12, 2006

Model: KX-TG2122

Mode : TX-Channel 35

Table 2, Handset

### Radiated Emissions

| Polarization | Frequency<br>(MHz) | Reading<br>(dB $\mu$ V) | Pre-<br>Amp<br>(dB) | Antenna<br>Factor<br>(dB) | Net<br>at 3m<br>(dB $\mu$ V/m) | Limit<br>at 3m<br>(dB $\mu$ V/m) | Margin<br>(dB) |
|--------------|--------------------|-------------------------|---------------------|---------------------------|--------------------------------|----------------------------------|----------------|
| H            | 913.067            | 70.2                    | 16                  | 33.0                      | 87.2                           | 94                               | -6.8           |
| H            | 456.533            | 31.0                    | 16                  | 26.0                      | 41.0                           | 46                               | -5.0           |
| H            | *1369.600          | 45.1                    | 34                  | 26.1                      | 37.2                           | 54                               | -16.8          |
| H            | 1826.133           | 45.1                    | 34                  | 27.2                      | 38.3                           | 54                               | -15.7          |
| V            | *2282.666          | 45.4                    | 34                  | 29.4                      | 40.8                           | 54                               | -13.2          |
| V            | *2739.200          | 45.7                    | 34                  | 30.4                      | 42.1                           | 54                               | -11.9          |
| H            | *3652.266          | 40.6                    | 34                  | 33.3                      | 39.9                           | 54                               | -14.1          |
| H            | *4565.333          | 39.6                    | 34                  | 34.9                      | 40.5                           | 54                               | -13.5          |
| H            | 5478.399           | 41.0                    | 34                  | 35.7                      | 42.7                           | 54                               | -11.3          |
| H            | 6391.466           | 39.5                    | 34                  | 36.9                      | 42.4                           | 54                               | -11.6          |

NOTES: 1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emissions radiated outside of the specified frequency bands, except harmonics, are attenuated by 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation, which meet the requirement of part 15.249(d).

\* Emission within the restricted band meets the requirement of part 15.205.

Test Engineer: Jess Tang

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### 3.4 Radiated Emission on the Bandedge

From the following plots, they show that the fundamental emissions are confined in the specified band (902MHz and 928MHz). In case of the fundamental emissions are within 2 MHz from the bandedge, the delta measurement technique is used for determining bandedge compliance.

Emissions radiated outside of the specified frequency bands, except harmonics, are attenuated by 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation, which meet the requirement of part 15.249(d).

Please refer to the following plots for radiated emission on the bandedge:

Plot H1A: Handset - Low Channel Emissions

Plot H1B: Handset - High Channel Emissions

For electronic filing, the above plots are saved with filename: emission.pdf

**EXHIBIT 4**  
**EQUIPMENT PHOTOGRAPHS**

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### 4.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: external photos.doc & internal photos.doc

**EXHIBIT 5**  
**PRODUCT LABELLING**

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### 5.0 Product Labelling

For electronic filing, the FCC ID label artwork and location is saved with filename: label.pdf

**EXHIBIT 6**  
**TECHNICAL SPECIFICATIONS**

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### 6.0 Technical Specifications

For electronic filing, the block diagram and circuit diagram are saved with filename: block.pdf and circuit.pdf respectively.

**EXHIBIT 7**  
**INSTRUCTION MANUAL**

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### 7.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf

Please note that the required FCC Information to the User is saved with filename: fcc information.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

**EXHIBIT 8**  
**SECURITY CODE INFORMATION**

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### 8.0 Security Code Information

The telephone has an internal security code with 65,536 possible combinations. Each time the HANDSET is placed on the BASE UNIT, the code is randomly set to a new combination.

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**EXHIBIT 9**  
**CONFIDENTIALITY REQUEST**

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### 9.0 Confidentiality Request

For electronic filing, a preliminary copy of the Confidentiality Request is saved with filename: request.pdf